California Monthly Climate Summary
December 2013

Weather Highlights

December 2013 was a slightly cool, dry month for California. According to the Western Region Climate Center's California Climate Tracker, the monthly average temperature was 41.4°F which is 0.4°F lower than the long-term average of 41.8°F. With a statewide average of 0.40 inches, precipitation in December was 10% of average. This is the driest calendar year on record with a total of 6.99 inches of precipitation. The mean for this period is 22.88 inches. The previous record low was in 1898 when 11.6 inches was recorded. Regional maximum and minimum temperature and precipitation plots for December and for the calendar year time period are shown at the end of the document.

December began with a low pressure system drifting down the coast and eventually coming inland over southern California. This was followed in the second week by a barrage of cold air bringing freezing temperatures across the state and record lows. The only significant weather system of the month came ashore during the second week bringing rain and low level snow due to the cold temperatures. Accumulations were limited though. Clearing weather behind this system brought another round of freezing temperatures to the state. During the third week offshore flow resulted in very dry conditions for southern California. Freezing conditions continued in the Central Valley. The month closed out under the influence of a strong high pressure system bringing record high temperatures during the day. The exceptionally dry air resulted in strong cooling at night with cooler than average minimum temperatures.

Preliminary records, reported on the National Weather Service Record Event Report, show that statewide there were 166 temperature records tied or broken and 0 precipitation records set for the month. Of the 166 temperature records set, 74 were for new high maximum temperatures and 63 were for new low minimum temperatures. Records were set over 26 days of the month. For the calendar year there were 1007 temperature records set and precipitation records set. Histograms of the monthly distribution of records are shown at the end of this document.

For the California Data Exchange Center's (CDEC) network of temperature gages used in this report, 233 stations recorded a minimum temperature below freezing during the month while zero stations reached or exceeded 100°F at least once during the month. Statewide extremes from the CDEC network of temperature gages are shown below. Also shown are the monthly average extremes from the CIMIS network. A table of regional average minimum, mean, and maximum temperatures for the CDEC stations are also shown at the end of the summary.

Precipitation in December was below average across the state. For the CDEC precipitation gages, the largest amount of precipitation recorded for the month was at Gasquet Ranger Station in the North Coast region with 2.35 inches. This is 14% of the average precipitation for this station for the month. At the other end of the

spectrum, Needles in the Colorado River Desert region recorded 0.01 inches of precipitation for the month which is 2% of average. For the CIMIS network, Durham in Butte County topped the precipitation charts with 1.07 inches for the month and 18 stations recorded no precipitation. Some CIMIS gages may show large precipitation totals if the gages are not covered during irrigation activities so care should be given to review precipitation data used from this network.

The 8-Station Index for northern California precipitation recorded 0.9 inches in December in 4 days of precipitation. On average, 9.0 inches of precipitation is recorded for the month. For the combined January to December total, the 8-Station Index recorded 16.3 inches which is the lowest Jan-Dec total in the period of record which dates back to water year 1921. The next lowest value was 18.69 inches set in 1976. Statewide, the average precipitation for the month was 15.9% of the long-term average based on the California Data Exchange Center (CDEC) gages. Precipitation percentages by region from the CDEC gages are shown in a table at the end of this document.

CoCoRaHS Update

December 2013 continues California's sixth year with CoCoRaHS – the Community Collaborative Rain, Hail and Snow Network. This group uses citizen volunteers to record rain, hail and snow data. The users enter the data online at the CoCoRaHS web site. The web site provides the opportunity to see spatial detail of rain and snow patterns. A map from December 7, 2013 is shown at the end of the document. As of the end of December, California has 1082 volunteers signed up spanning 54 of California's 58 counties. The counties without volunteers are Alpine, Colusa, Glenn, and Modoc. The county with the most volunteers at the end of December is Sonoma with 98 volunteers. San Diego County is close behind with 96 volunteers. For the month of December, 11,071 reports were recorded for California. The largest daily rain total for CoCoRaHS- CA in December was in Placer County where 1.48 inches was recorded on 12/7/2013. There were 130 snowfall reports recorded with the largest being 28 inches in Placer County on 12/7/2013. Three hail reports were submitted in December with one in San Diego County on 12/19/2013 and two in San Bernardino County on 12/13/2013 and 12/19/2013 with rice to pea-sized stones. To join CoCoRaHS or find more information, please visit http://www.cocorahs.org.

Extreme Precipitation Network

Dry conditions in December excluded extreme precipitation events for the month. On the other hand, the network gave some insight into how dry the atmosphere became during the month. An integrated water vapor sensor map for 12/20/2014 is shown at the bottom of the document. Values are in centimeters. For precipitation events these readings are normally above 1.5 cm and for heavier rainfall above 2.5 cm. The readings on 12/10 ranged from 0.11 cm over Yosemite National Park to 0.82 cm on the North Coast.

Snowpack and Water Supply Conditions

At the end of December 2013, the regional snowpack information showed below average conditions for the state. The northern region showed one inch of snow water equivalent (SWE) which is 11% of average for the date and 4% of the April 1st average. The central region registered 2 inches of SWE which is 22% of average for the date and 8% of the April 1st value. The southern region also registered 2 inches of SWE which is 28% of average for the date and 9% of the April 1st average. This yields a statewide average of 2 inches of SWE which is 20% of average for the date and 7% of the April 1st value. April 1 is considered the traditional peak of the snowpack. The Water Supply Index (WSI) for WY2013 for the Sacramento Basin fell into the dry category and the San Joaquin fell into the critical category. Further information can be found at http://cdec.water.ca.gov/water_supply.html. A historical listing of water year categories for both basins can be found at http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST.

Drought Monitor and Seasonal Outlook

The maps for California for November 26, 2013 and December 31, 2013 are shown below. The Drought Monitor maps can be found on the NDMC website http://drought.unl.edu/dm/. These maps are largely a reflection of precipitation and soil moisture deficit estimates. As of the December 31st depiction, 27.59% of California is depicted in D3 or extreme drought, 54.94% of California is depicted in the D2 or severe drought category, 6.72% of California is depicted in the D1 or moderate drought category. An additional 3.14% of the state is depicted as D0 or abnormally dry and 2.61% of the state is drought free. Maps are updated weekly.

The U.S. Seasonal Drought Outlook for February through April from NOAA depicts California in persisting drought throughout the state. This forecast is based primarily on climatology and forecast models. Maps and information can be found at http://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.html. Updates are provided twice per month.

For more information on water conditions in California, visit http://www.water.ca.gov/waterconditions/. A table showing end-of-month reservoir storage by hydrologic region is shown at the end of this document. Statewide, reservoir storage at the end of December was 70% of average. At the end of December 2012, storage was 110% of average.

ENSO Conditions and Long-Range Outlooks

The El Niño/Southern Oscillation (ENSO) is currently in neutral conditions. Equatorial sea surface temperature anomalies for the tropical Pacific have been normal with values of -0.2°C in the Niño 3.4 at the end of December. The October through December 3-month running mean of the Ocean Niño Index (ONI) is -0.3. Five consecutive ONI values need to be below the threshold o f -0.5 for conditions to be classified as a La Niña event (five consecutive values above the 0.5 threshold need to be observed for classification as an El Niño event). Most forecast models have the tropical sea surface temperatures transitioning to warmer conditions by late spring

2014. More information can be found at the Climate Prediction Center's web site: http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ Updates are posted weekly. The latest three month outlook (February through April) from NOAA indicates above average chances for warmer than normal temperatures and below average precipitation across the state. Outlook plots and discussions can be fount at http://www.wrcc.dri.edu/longrang/. General weather information of interest can be found at http://www.noaawatch.gov/. For anomaly information please see http://www.wrcc.dri.edu/anom/cal_anom.html.

Agricultural Data

December 2013 saw dry weather forced irrigation and freeze damage. Winter wheat condition deteriorated during the month due to lack of precipitation. Cotton fields were plowed down in accordance with regulations. Orchards were pruned and irrigated. Citrus damaged by the freezing weather was sent for juicing. Winter vegetables were harvested in the Imperial Valley. The carrot crop faced damage due to the freeze. Other winter field maintenance activities also occurred. Range conditions remained in fair to very poor condition due to the lack of significant precipitation. Supplemental feeding continued and ranchers have been searching for winter feed. For further crop information see http://www.nass.usda.gov/index.asp.

Other Climate Summaries

California Climate Tracker (new product of Western Region Climate Center)
Golden Gate Weather Service Climate Summary
NOAA Monthly State of the Climate Report

Statewide Extremes (CDEC)

High Temperature – 91°F (Santa Fe, South Coast)
Low Temperature – -18°F (Adin Mountain, Sacramento)
High Precipitation – 2.35inches (Gasquet Ranger Station, North Coast)
Low Precipitation – 0.01 inches (Needles, Colorado River Desert)

Statewide Extremes (CIMIS)

High Average Maximum Temperature – 73.1^0F (Santa Paula, Ventura County)
Low Average Minimum Temperature – 7.9^0F (Buntingville, Lassen County)
High Precipitation – 31.07 inches (Durham, Butte County)*
Low Precipitation – 0 inches (18 stations)
*Sometimes irrigation water from sprinklers gets counted as precipitation if the gage is not covered.

Statewide Precipitation Statistics

Hydrologic Region	Region Weight	Basin Reporting			Stations Reporting			% of Historic Average	
		Basins	Dec	Oct-Dec	Stations	Dec	Oct-Dec	Dec	Oct-Dec
North Coast	0.27	5	4	3	17	4	3	14.20%	14%
SF Bay	0.03	2	1	1	6	2	1	16.30%	15%
Central Coast	0.06	3	2	1	11	3	1	9.40%	63%
South Coast	0.06	3	2	1	14	2	1	22.10%	63%
Sacramento River	0.26	5	5	5	41	30	28	8.80%	16%
San Joaquin River	0.12	6	6	5	24	12	10	31.80%	27%
Tulare Lake	0.07	5	5	5	28	20	19	18.40%	32%
North Lahontan	0.04	3	2	1	13	3	2	24.90%	21%
South Lahontan	0.06	3	2	1	15	5	4	18.90%	47%
Colorado River	0.03	1	1	1	6	2	1	5.20%	77%
Statewide Weighted Average	1	36	30	24	175	83	70	15.89%	27%

Statewide Mean Temperature Data by Hydrologic Region (degrees F)

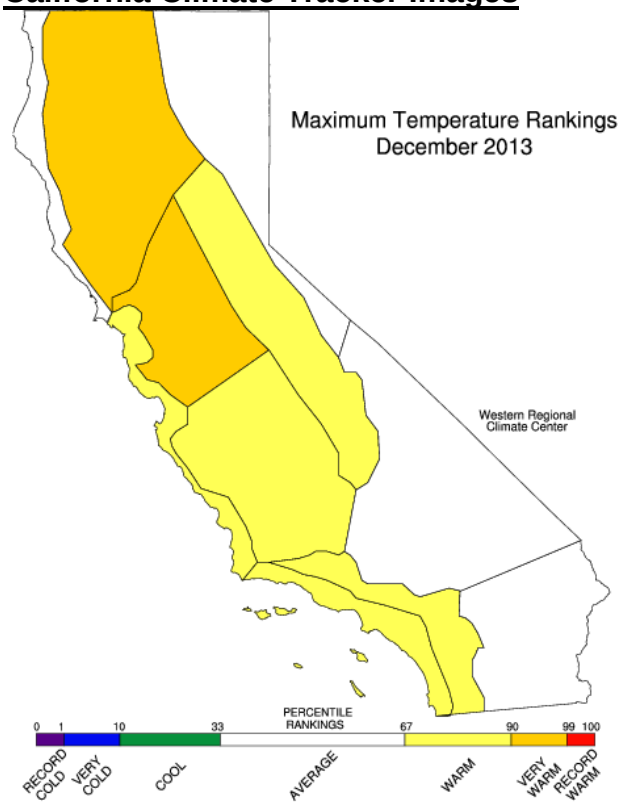
Hydrologic Region	No. Stations	Minimum	Average	Maximum
North Coast	21	12.1	38.2	65.3
SF Bay	8	26.8	49.1	68.3
Central Coast	10	22.4	48.8	79.1
South Coast	39	30.7	53.1	80.2
Sacramento	71	10.2	39.3	67.7
San Joaquin	44	9.2	38.2	67.5
Tulare Lake	18	7.2	33.4	59.0
North Lahontan	26	-4.7	28.6	56.5
South Lahontan	13	7.0	34.5	62.5
Colorado River Desert	7	32.7	54.0	78.1
Statewide Weighted Average	257	12.7	39.9	67.4

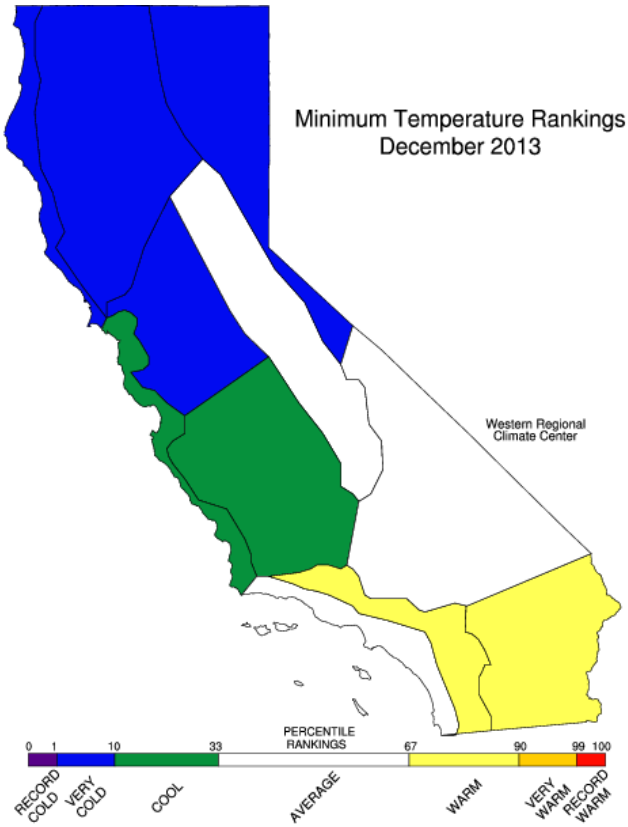
End-of-Month Reservoir Storage by Hydrologic Region

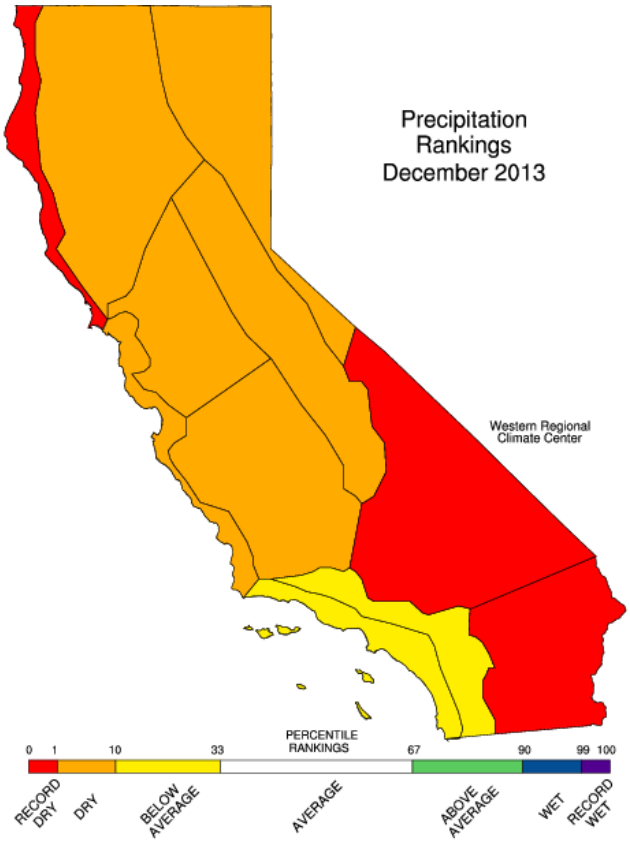
Storage in Thousand Acre-Feet (taf)

End-of-December Reservoir Storage	Number of Reservoirs	Average Storage (taf)	2013 Storage (taf)	% of Average
North Coast	6	1,993	1,408	71%
San Francisco Bay	17	423	369	87%
Central Coast	6	535	214	40%
South Coast	29	1,308	1,163	89%
Sacramento	43	9,826	6,836	70%
San Joaquin	34	6,501	4,707	72%
Tulare	6	684	335	49%
North Lahontan	5	473	211	45%
South Lahontan	8	265	229	86%
Total	154	22,012	15,475	70%

California Climate Tracker Images






Precipitation
Rankings
December 2013
Western Regional
Climate Center
PERCENTILE
RANKINGS
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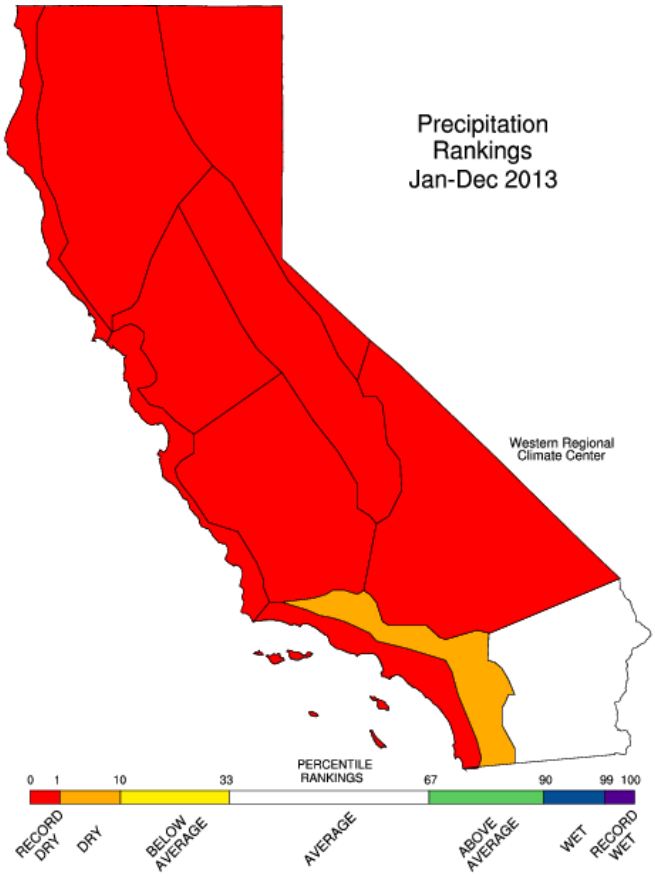
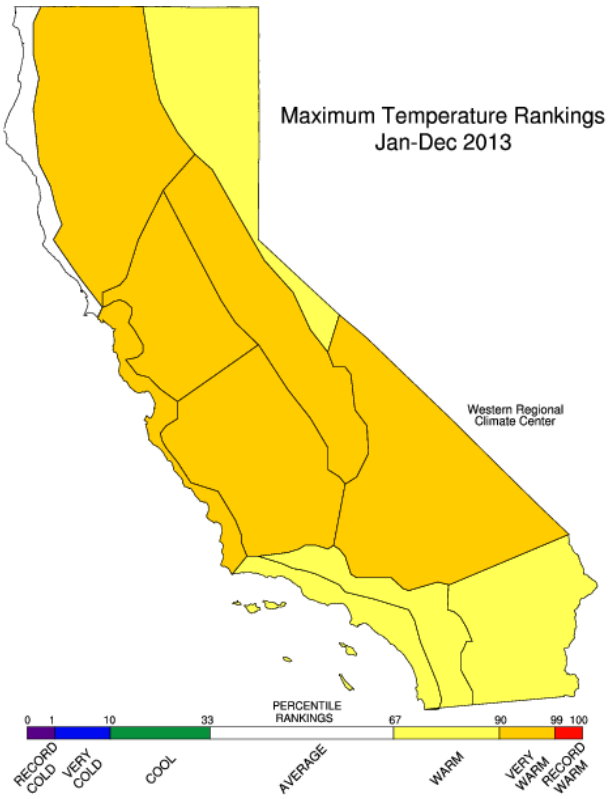
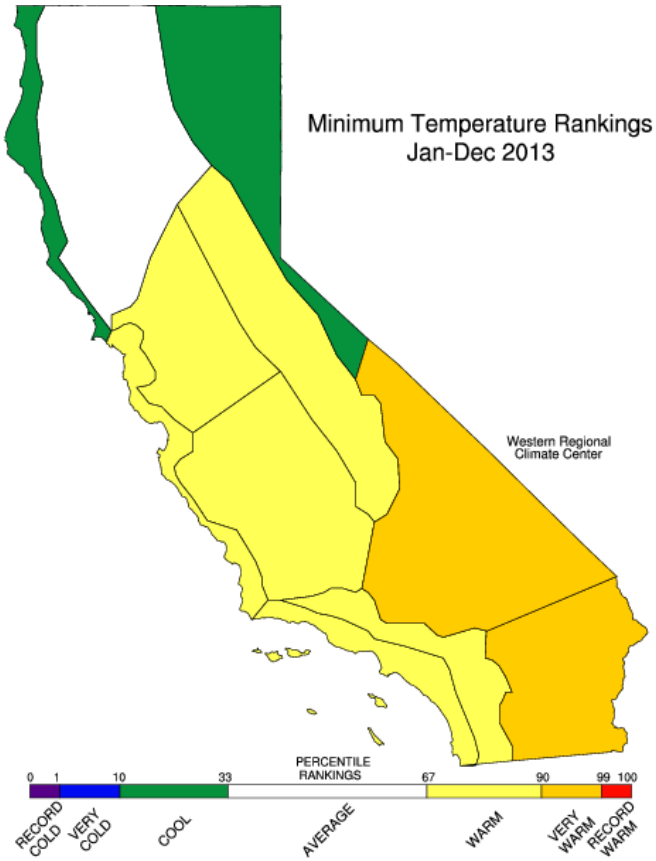
RECORD DRY
DRY
BELOW AVERAGE
AVERAGE
ABOVE AVERAGE
WET
RECORD WET


Precipitation
Rankings
Jan-Dec 2013
Western Regional
Climate Center
PERCENTILE
RANKINGS
0 1 10 33 67 90 99 100
RECORD DRY
DRY
BELOW AVERAGE
AVERAGE
ABOVE AVERAGE
WET
RECORD WET


Maximum Temperature Rankings
Jan-Dec 2013
Western Regional
Climate Center
PERCENTILE
RANKINGS
0 1 10 33 67 90 99 100
RECORD COLD
VERY COLD
COOL
AVERAGE
WARM
VERY WARM
RECORD WARM


Minimum Temperature Rankings
Jan-Dec 2013
Western Regional
Climate Center
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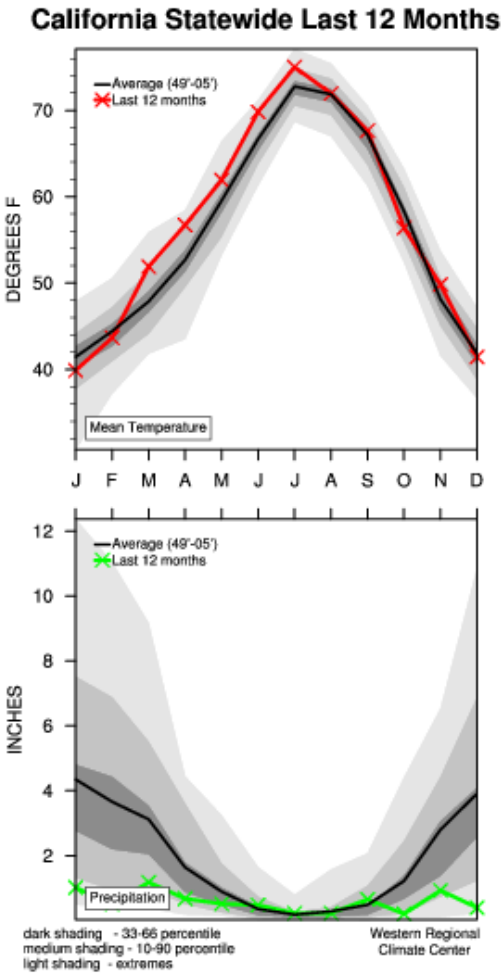
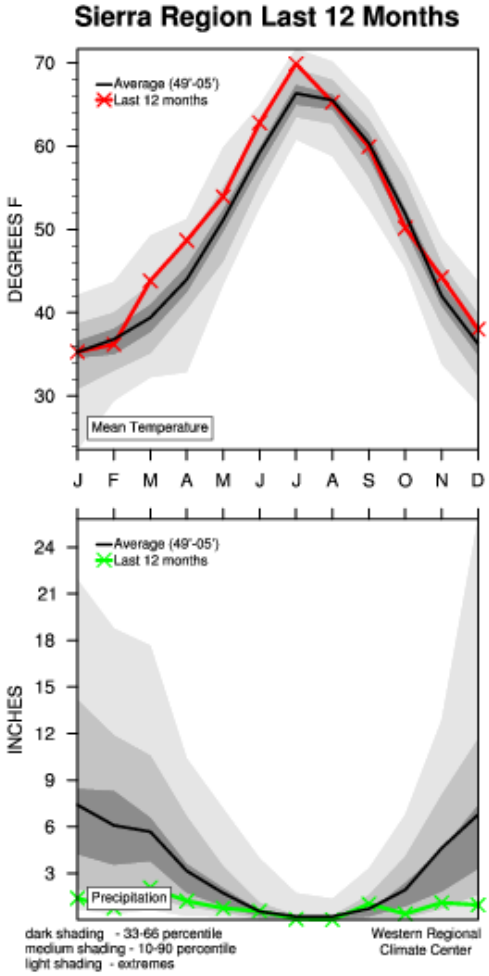
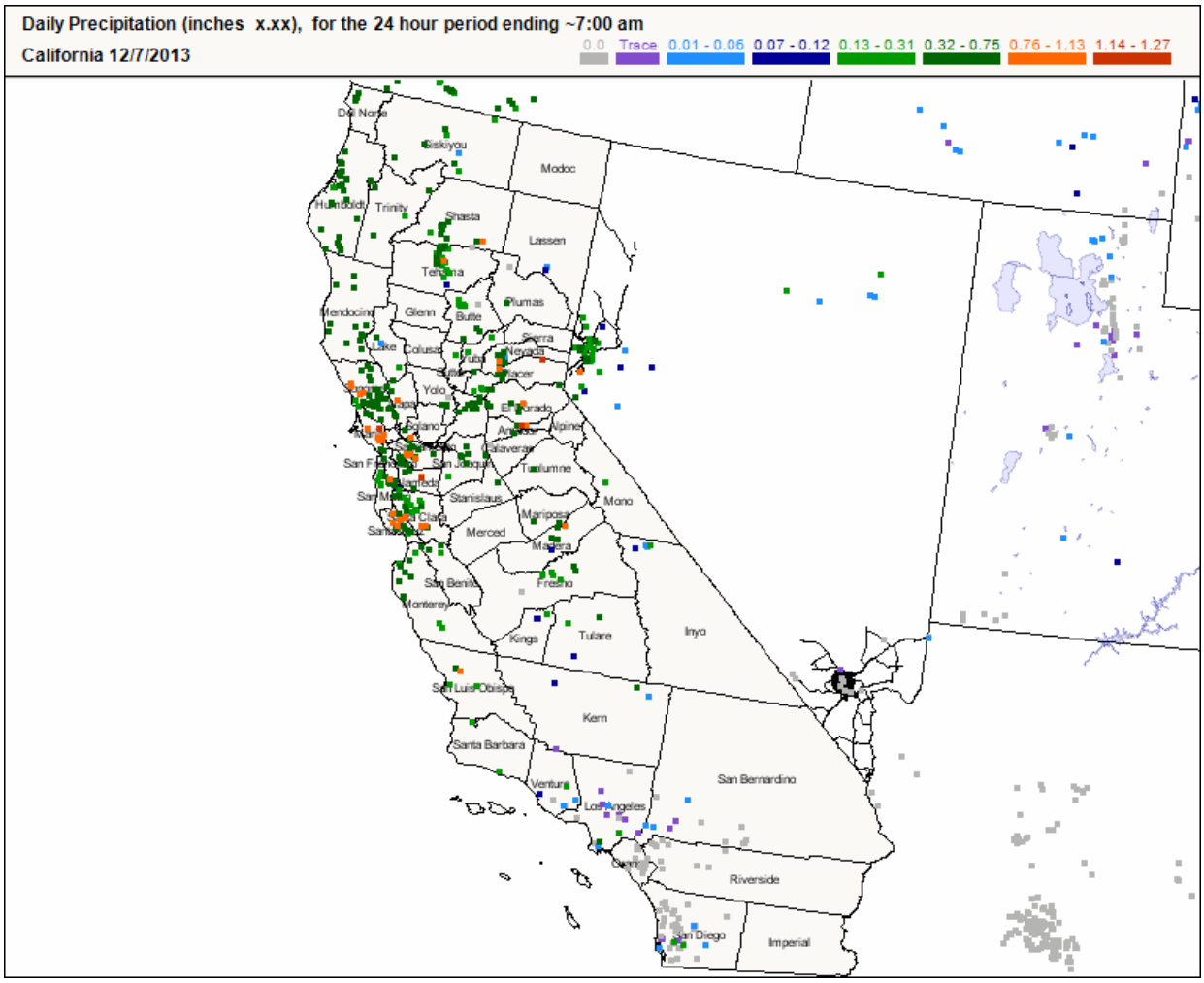
RANKINGS
0 1 10 33 67 90 99 100
RECORD COLD
VERY COLD
COOL
AVERAGE
WARM
VERY WARM
RECORD WARM


California Statewide Last 12 Months
Average (49'-05')
Last 12 months
DEGREES F
70
60
50
40
Mean Temperature
J F M A M J J A S O N D
12
10
8
6
4
2
INCHES
Precipitation
dark shading - 33-66 percentile
medium shading - 10-90 percentile
light shading - extremes
Western Regional
Climate Center

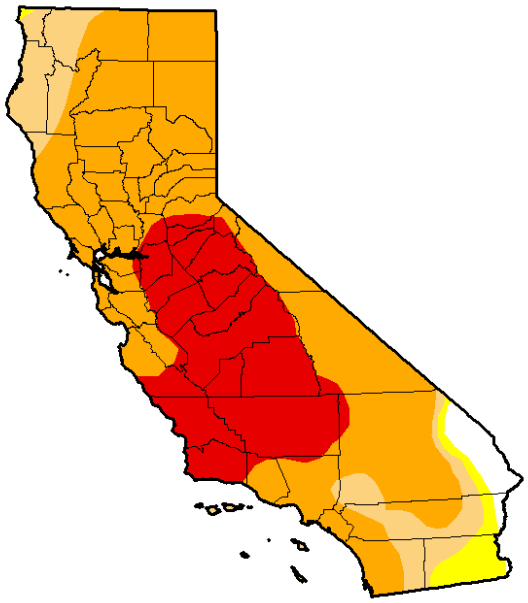

Sierra Region Last 12 Months
Average (49'-05')
Last 12 months
DEGREES F
70
60
50
40
30
Mean Temperature
J F M A M J J A S O N D
24
21
18
15
12
9
6
3
INCHES
Precipitation
dark shading - 33-66 percentile
medium shading - 10-90 percentile
light shading - extremes
Western Regional
Climate Center

CoCoRaHS Map



U.S. Drought Monitor

California



November 26, 2013

(Released Thursday, Nov. 28, 2013)

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	2.61	97.39	94.15	82.53	27.59	0.00
Last Week 11/19/2013	2.61	97.39	96.00	84.12	27.59	0.00
3 Months Ago 8/27/2013	0.00	100.00	98.23	93.86	11.36	0.00
Start of Calendar Year 1/1/2013	31.75	68.25	55.32	22.50	0.00	0.00
Start of Water Year 10/1/2013	2.63	97.37	95.95	84.12	11.36	0.00
One Year Ago 11/27/2012	6.77	93.23	70.47	28.16	1.14	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

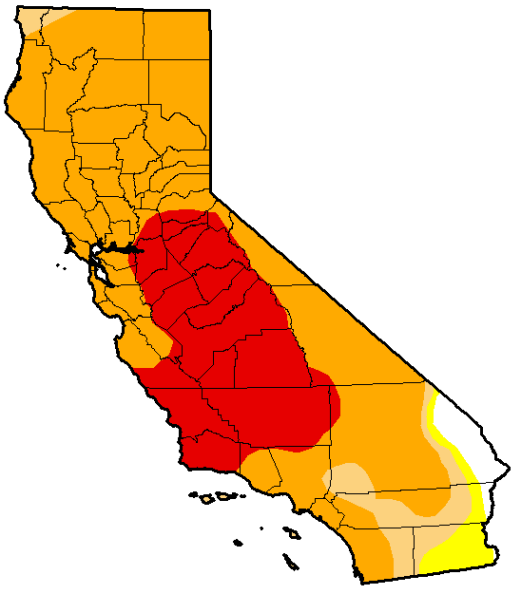
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Richard Heim
NCDC/NOAA

http://droughtmonitor.unl.edu/

U.S. Drought Monitor

California



December 31, 2013

(Released Thursday, Jan. 2, 2014)

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	2.61	97.39	94.25	87.53	27.59	0.00
Last Week 12/24/2013	2.61	97.39	94.25	84.88	27.59	0.00
3 Months Ago 10/1/2013	2.63	97.37	95.95	84.12	11.36	0.00
Start of Calendar Year 1/1/2013	31.75	68.25	55.32	22.50	0.00	0.00
Start of Water Year 10/1/2013	2.63	97.37	95.95	84.12	11.36	0.00
One Year Ago 1/1/2013	31.75	68.25	55.32	22.50	0.00	0.00

Intensity:

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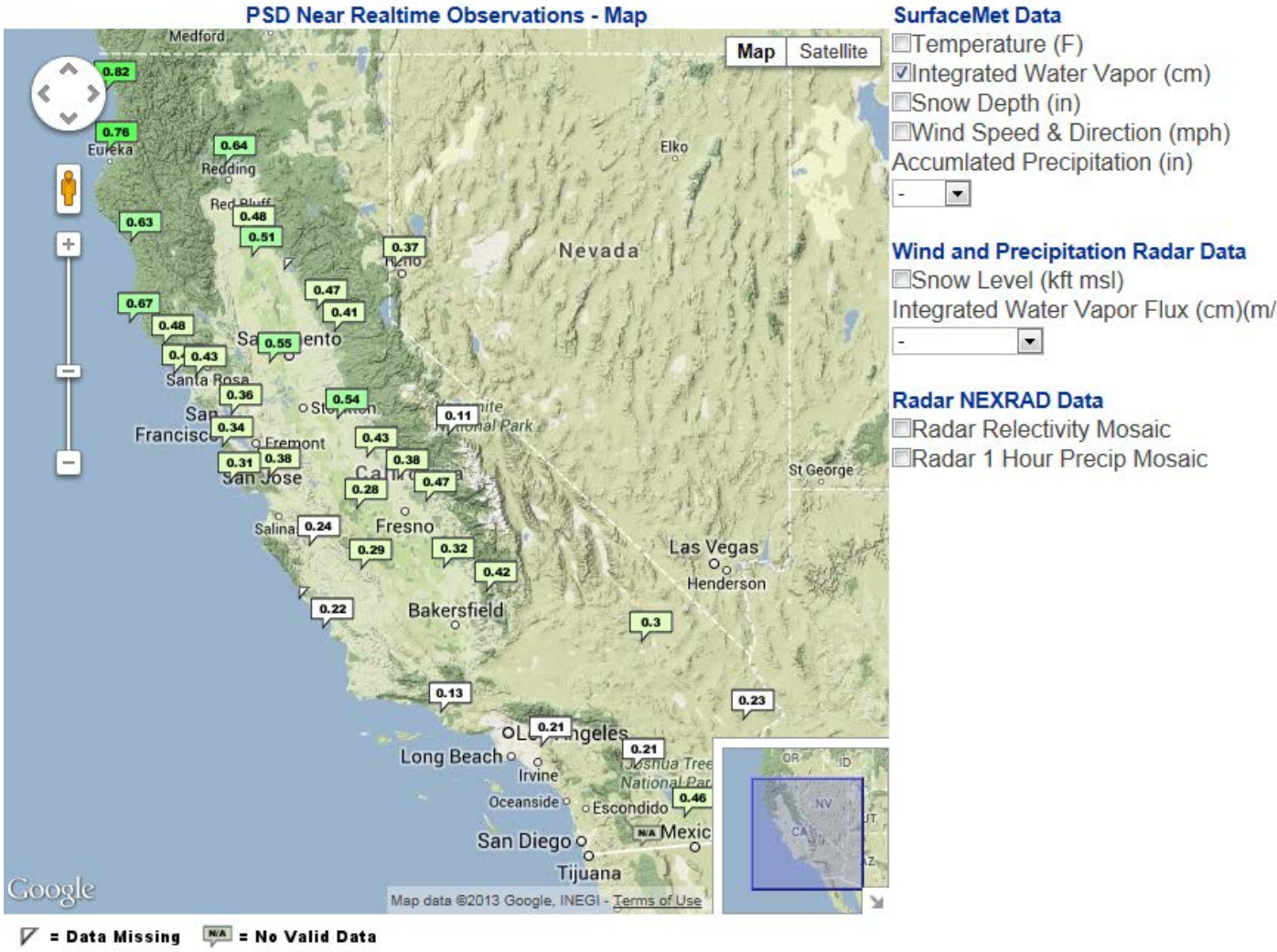
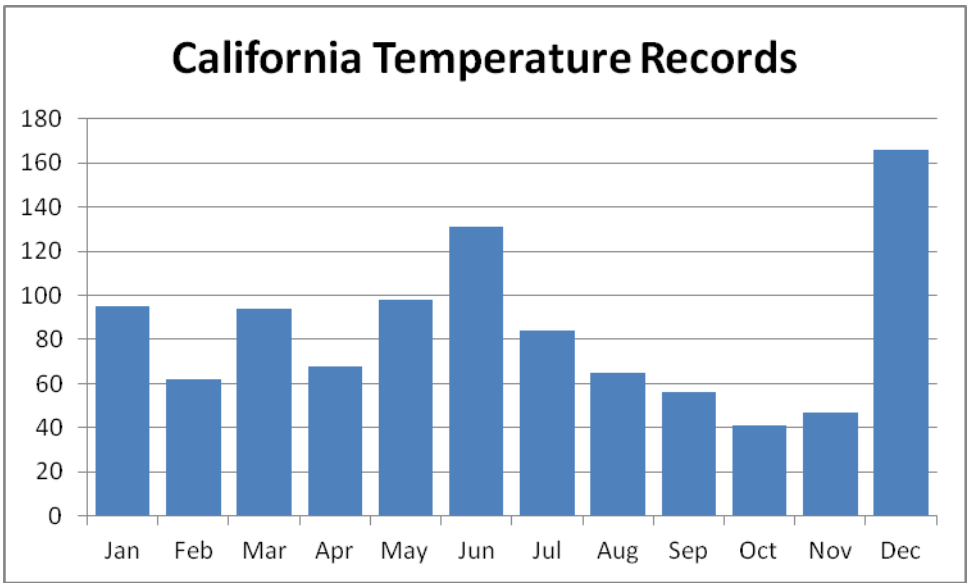
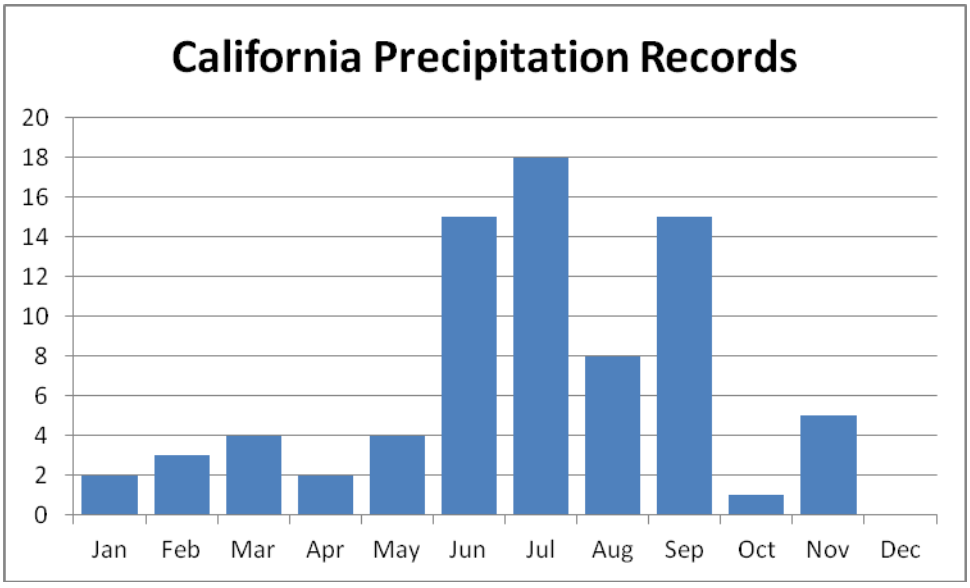


Total Integrated Water Vapor (GPS-Met sensor) readings in centimeters for 12/10/2013. During weather events we look for readings above 2.5 centimeters.


California Temperature Records
180
160
140
120
100
80
60
40
20
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


California Precipitation Records
20
18
16
14
12
10
8
6
4
2
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec